SCOTTISH INSTITUTE FOR RESEARCH IN ECONOMICS

SIRE DISCUSSION PAPER

SIRE-DP-2015-26

The role of education in equity portfolios during the recent financial crisis

Udichibarna Bose
Ronald MacDonald
Serafeim Tsoukas

UNIVERSITY OF GLASGOW

www.sire.ac.uk

The role of education in equity portfolios during the recent financial crisis

Udichibarna Bose, Ronald MacDonald, Serafeim Tsoukas*

Department of Economics
Adam Smith Business School
University of Glasgow
G12 8QQ, UK

Abstract

Using a panel of 38 economies, over the period 2001 to 2010, we analyse the link between diversification in equity portfolios and different facets of education. We find that traditionally used measures of education play an important role in reducing equity home bias. After separating countries according to their level of financial development, we find that less developed economies tend to benefit more from an improvement in the level of education compared to their more developed counterparts. We also find that the beneficial effect of education is more pronounced during the most recent financial crisis, especially for economies with less developed financial markets.

Keywords: Home bias; Equity markets; International diversification; Education; Financial crisis.

JEL: F30; G11; G23; E20

*Corresponding Author: Serafeim Tsoukas, University of Glasgow, G12 8QQ; Tel: ++44 141 330 6325; Email: serafeim.tsoukas@glasgow.ac.uk. We are grateful to Lieven De Moor and Rosanne Vanpée for making available to us the market capitalisation data of equities. We also thank John Burger, Alessio Ciarlone, George Panos, Vikrant Vig and participants at the SGPE Crieff Conference (2013), the 4th EMG-ECB Emerging Markets Finance Conference (2014), the 12th INFINITI Conference on International Finance (2014) and the 29th Annual Congress of the European Economic Association (2014) for useful comments and suggestions. The first author gratefully acknowledges financial support from the Economic and Social Research Council (Grant number: ES/J500136/1). Any remaining errors are our own.

1. Introduction

A well-known phenomenon in international capital markets is the extent to which equity portfolios are concentrated in investors' domestic markets. In other words, investors seem reluctant to reap the full benefits of international diversification and overinvest in their domestic assets rather than in international portfolios. This preference is commonly termed as the 'Home bias puzzle' and has attracted a great deal of attention in an attempt to resolve this puzzle. Following the seminal work of French and Poterba (1991), several authors have documented a number of plausible explanations which primarily focus on institutional factors or individual investor behaviour (see Lewis, 1999; Karolyi and Stulz, 2003 and Sercu and Vanpée, 2012 for surveys). What is less researched, however, is the role of education in international portfolio diversification. Our aim is to fill this gap by exploring the link between various measures of education and equity home bias, paying special attention to the heterogeneity in financial development and the most recent financial crisis.

The last two decades have seen a phenomenal growth of financial instruments and products as evidenced by a number of new assets that were developed based on subprime and other mortgages before the 2007-09 global financial crisis. Yet, the ability of investors to make sound financial decisions was challenged in the light of soaring losses observed during this period (see Klapper et al. 2013). This process has underlined the need for better education and financial sophistication among citizens, educators, community groups, businesses, policymakers and government agencies to ensure their financial security (see Lusardi, 2008; Lusardi and Tufano, 2009 and Gerardi et al., 2010). Education works mainly through the behavioural patterns of investors. In particular, educated investors demonstrate higher level of competence and invest more heavily in foreign equities compared to individuals with lower level of education (Heath and Tversky, 1991; Bernheim and Garrett, 2003 and Magi, 2009). Thus, it seems reasonable to suppose that knowledgeable, educated and more financially aware people are able to manage their finances better by making good and profitable decisions for their economic security and well-being. A large literature has considered the role of education and financial literacy in many aspects of economic behaviour both at the micro and the macro level (see Stango and Zinman, 2009 and Guiso and Jappelli, 2005, 2008, for surveys). One popular finding is that there exists a positive link between education and GDP growth, suggesting that human capital matters in affecting economic growth (see Guariglia and Poncet, 2008). Another important result postulates formal education matters for the process of financial decision making (see Graham et al.,

2009 and Cole et al., 2012) and financial participation **(**see Karlsson and Nordén, 2007 and Van Rooij et al., 2011).

The purpose of this paper is to bridge the literatures on international portfolio diversification and education in order to provide, for the first time, a systematic empirical analysis of the impact of education on equity holdings taking into account both the different degree of financial development among economies and the most recent financial crisis. Our motivation for exploring the role of education in equity portfolios stems from the fact that education influences financial awareness, knowledge, skills, attitude and the behaviour of investors to make sound financial decisions in order to achieve individual financial well-being. Lack of education and financial awareness, on the other hand, can be key reasons behind the lower degree of international portfolio diversification and an increasing reliance on domestic equity portfolios. Hence, education and financial literacy help to reduce information acquisition costs related to foreign investment opportunities, improving the awareness of the benefits and risks of international portfolio diversification.

In our study we also recognise that education may not influence all economies in a proportional way. We allow for the fact that economies with different levels of financial development might respond to improvements in the level of education disproportionally since emerging market economies typically find it difficult or prohibitively expensive to access foreign financial markets (Mizen et al., 2012). However, emerging markets have experienced considerable development in their financial markets over the past few decades accompanied with lower inflation, stronger institutions and creditor rights (Burger and Warnock 2003, 2006 and Guariglia and Poncet, 2008). In addition, the above link should be more potent during extreme economic events such as the most recent financial crisis, which originated in the US in mid-2007, as it caused a sharp reduction in asset prices. The pattern of capital flows was vastly heterogeneous across countries as investors tried to reduce their international exposure during the crisis and accordingly increase their exposure in improved economic conditions (Raddatz and Schmukler, 2012). This, in turn, resulted in a decline in the assets invested abroad and thus an increase in the proportion of equity portfolios which are concentrated in the domestic market of investors (Milesi-Ferretti and Tille, 2011).

The value added of the present paper is threefold. First, we consider a direct role of education in influencing equity home bias. In addition to the country-specific and financial indicators previously considered, this study also considers the impact of different measures of education. This approach complements the existing empirical literature on international portfolio holdings (see Chan et al., 2005, Fidora et al., 2007 and De Moor and Vanpée, 2013),

which highlights the effect of different institutional and financial factors, geographical, political and behavioural effects on home bias in international portfolios.

The second main contribution of this paper is that, using comparable multi-country panel data, we are able to identify which countries are more likely to benefit from a higher level of education. Intuitively, we do not expect all countries to be equally affected by education. It is well accepted that economic literacy differs widely across countries and tends to be rather limited in poorer demographic groups (Jappelli, 2010). Countries with higher levels of education tend to benefit much more from financial liberalisation (Bekaert et al., 2001) and also tend to experience higher growth (Guariglia and Poncet, 2008). In this paper, we will test whether there is a differential effect of education on international diversification for economies with more and less developed financial markets.

Finally, we will assess whether the education-home bias nexus has evolved over time for economies with more and less financially developed markets. The most recent financial crisis has provided fertile ground to analyse the changes and developments that took place in the financial systems of several countries. During the crisis period, markets face macroeconomic imbalances, liquidity risk and international risk, leading to a possibility of contagion (Arghyrou and Kontonikas, 2012). Hence, there is a need of financial awareness among investors to make correct investment decisions during periods of distress. Gerardi et al. (2010) show that limited financial literacy (numerical ability) played an important role in the recent subprime mortgage crisis in the US. Thus, the link between education and financial literacy is likely to be more potent during the financial crisis as it might help in resolving information asymmetries in the economy and improve investors' competence level and cognitive abilities.

The paper is organised as follows. In section two we offer a brief review of the relevant literature. In section three we describe the econometric modelling strategy. We present the data used in our empirical analysis along with summary statistics in section four, and we report the econometric results in section five. In section six we check the robustness of our findings and we provide concluding remarks in section seven.

2. Review of existing literature

There is a wide literature which highlights the advantages of international portfolio diversification, but most of the studies are from a US perspective. These studies show that diversification of portfolios reduces risk (Solnik, 1974) and that benefits can be attained by investing in emerging markets (Harvey, 1995). Rowland and Tesar (2004) show that

investments in stocks of multinational firms can be profitable and hence, utility gains from the addition of international assets to a benchmark portfolio of domestic equities are substantial. However, for investors in emerging markets, international diversification is likely to be more beneficial as these countries face higher risk (Driessen and Laeven, 2007). Despite the gains from international diversification, investors still tend to invest more in their domestic stock and bond markets.

Since the seminal contribution of French and Poterba (1991) and Tesar and Werner (1995), who provided evidence of equity home bias of around 94%, 98% and 82% of their total equity investments in the US, Japan and the UK respectively, several justifications have been offered in the literature for the existence of the equity home bias puzzle. These include institutional explanations, such as hedging possibilities. For instance, studies by Adler and Dumas (1983) and Cooper and Kaplanis (1994) identified domestic risk hedging as an important explanation for home bias. Other proposed explanations include hedging foreign exchange risk (Fidora et al., 2007 and Mishra, 2011), transaction costs and barriers to international investments (Stulz, 1981), information asymmetries (Kang and Stulz, 1997 and Ahearne et al., 2004), geographical proximity and familiarity (Coval and Moskowitz, 1999 and Kilka and Weber, 2000), corporate governance and transparency (Gelos and Wei, 2005) and behavioural-based explanations (Fellner and Maciejovsky, 2003). Excellent literature reviews on home bias are provided by Lewis (1999) and Sercu and Vanpée (2012). The upshot is that equity home bias is a complex phenomenon and is probably caused by a combination of behavioural and institutional biases.

Moving to the education literature, Bernheim (1995, 1998) was the first to highlight that most individuals lack basic financial knowledge and numeracy. Numerous surveys have emphasised that US population or specific sub-groups have very low levels of economic and financial literacy (see Hilgert et al., 2003; Agnew and Szykman, 2005). Studies generally confirm the importance of financial education by showing a direct and positive relation between financial education and financial decision making (Hilgert et al., 2003; Cole et al., 2011). Education also helps in increasing participation in stock market investments (Van Rooij et al., 2011) and diversification of portfolios (Campbell, 2006). In addition, it influences borrowing decisions and the probability of a person having pension (Cole et al., 2012).

Education further impacts on financial behaviour by beliefs and attitudes. In particular, educated investors demonstrate higher level of confidence (Graham et al., 2009), greater

optimism towards financial markets (Puri and Robinson, 2007) and better planning in terms of retirement and making crucial financial decisions (Lusardi and Mitchell, 2006, 2007). Since the end of 1980s, there has been more deregulation and financial innovation resulting in more availability of financial investment options in equities. Many researchers have found that lack of knowledge leads to poor risk diversification, inefficient portfolio allocations and a low savings rate. Banks and Oldfield (2007) analysed the numerical ability and other aspects of cognitive ability among a sample of older adults in England and found that numeracy levels are strongly correlated with understanding of pension arrangements, perceived financial security, retirement saving measures and investment portfolios.

The international evidence highlights the existence of very low levels of financial literacy around the world. In an earlier survey, the Organization for Economic Co-operation and Development (OECD, 2005) has confirmed that widespread financial illiteracy prevails in countries such as Europe, Australia, and Japan. Jappelli (2010) shows wide diversities in the levels of economic literacy, pointing out that lower levels of development in stock and credit markets are related with lower levels of literacy[1].

The studies discussed above provide a useful background for the linkage between education and equity portfolio diversification. In the home bias context, very few studies address this issue. Karlsson and Nordén (2007) provide evidence that higher levels of education are associated with a lower likelihood of home bias, focusing on the Swedish pension system. Kimball and Shumway (2010) show that financial education has significant explanatory power in home bias and market participation by developing an index of investor sophistication derived from April 2005 Survey of US Consumers. Giofre (2012) also documents the impact of financial education and investor protection on equity portfolios. Yet, the above studies do not take into account the heterogeneity of financial development at the country level, nor do they extend to the recent financial crisis. In this paper, we ask how important is education in determining equity portfolios taking into account both the degree of financial development the recent global financial crisis. In the sections that follow we turn to our estimation strategy and data.

[1] In Jappelli's (2010) study, the statistics or financial literacy range from a score of less than 3 in South Africa, Venezuela, Peru, Mexico, and Croatia to a score of above 7 for Ireland, Finland, and Singapore.

3. Empirical implementation

3.1 The baseline specification

In order to establish whether different measures of education affect international diversification in equity markets, we model the determinants of equity home bias and check whether education is a significant determinant. Following the recent literature on international diversification (see Chan et al., 2005 and Mondria and Wu, 2013) our empirical models are estimated using Ordinary Least Squares (OLS)[2]. We consider the following baseline model:

$$EHB_{it} = a_0 + a_1 Edu_{it} + a_2 X_{it} + e_{it}, \quad (1)$$

where i = 1, 2, …., *N* refers to the cross-section of units (countries in this case), t = 1, 2, …., *T* refers to the time period, EHB_{it} is the dependent variable of equity home bias for country i and year t, respectively. Edu denotes education in country i and year t, measured in three different ways using country averages of tertiary education, mathematical numeracy taken from OECD-PISA test scores and the degree of managers' finance skills. X is the vector of country-specific factors which includes economic health, information related-variables, financial liberalisation, financial market development, diversification benefits and financial factors and finally, foreign exchange risk. e_{it} is a disturbance term which varies with time and across different countries. In order to control for cyclical factors originating from the business cycle we include time dummies in our regressions.

The dependent variable is the home bias measured for equity markets. Following Cooper and Kaplanis (1994), Sercu and Vanpée (2007, 2012) and De Moor and Vanpée (2013), the equity home bias is calculated by subtracting the proportional market capitalisation from the proportion of domestic equities in a country's portfolio. Thus,

$$EHB_{it} = \frac{EQ_{it}}{TEQ_{it}} - \frac{MEQ_{it}}{WEQ_{it}}, \quad (2)$$

where $EQ_{it}$is domestic equity holdings of investors in country i at time t, TEQ_{it} is the total equity portfolio held by the investors in country i at time t, MEQ_{it} is equity market capitalisation of country i for time t and WEQ_{it} is the total world equity market capitalisation.

The effects of education on various aspects of financial behaviour have been analysed in previous studies (Kennickell et al., 1996; Karlsson and Nordén, 2007; and Stango and Zinman, 2009). The upshot is that education is associated with financial sophistication and

[2] To ensure that our results are not driven by the potential endogeneity in our regressors we also employ an instrumental variables (IV) method.

more irreprehensible financial behaviour. In the home bias context, Karlsson and Nordén (2007) show that higher levels of education are associated with a lower likelihood of home bias in the Swedish pension system. Kimball and Shumway (2010) show that financial education has significant explanatory power in home bias and market participation[3]. Moving this literature forward, we employ different measures of education to capture, for the first time, the effects of a change in formal education and finance/numeracy skills on international portfolio diversification, paying special attention to the recent financial crisis and the different levels of financial architecture.

As already noted, education is measured using three different indicators to ensure the robustness of our results[4]. We begin by employing tertiary school enrolment rates to capture the effect of formal education (Jappelli, 2010)[5]. We then employ two measures of financial education/numeracy in the spirit of Jappelli (2010). Specifically, we allow for a broader definition of education by using OECD-PISA test scores which indicates mathematical numeracy[6]. We also measure the availability of finance skills from managers' surveys. Both finance skills and mathematical numeracy are good measures of financial literacy since they are related to three concepts of financial knowledge, as identified by Lusardi and Mitchell (2013), these are numeracy and capacity to perform calculations related to interest rates and understanding the concepts of inflation and risk diversification[7]. Higher levels of *education* imply higher levels of financial sophistication and investor competence, therefore, reducing information asymmetries. In turn, we expect higher levels of education to be associated with lower levels of home bias in equity markets.

In addition to education, which is the core explanatory variable, we include in vector X a set of control variables which have been found to explain portfolio diversification in previous studies. We categorise these variables into six groups[8]:

[3] Kimball and Shumway (2010) develop an index of investor sophistication using the data from April 2005 Survey of Consumers based on a questionnaire of 14 questions.
[4] Table A1 in the appendix provides precise definitions for the measures of education and other variables.
[5] World Bank defines tertiary education as university-level education which includes undergraduate or postgraduate education (e.g universities, colleges, technical training institutes, community colleges, nursing schools, research laboratories, centres of excellence and distance learning centres).
[6] In 2012, the OECD carried out a large-scale international study to assess financial literacy of young people. This data item, however, contain no historical values which are vitally important for the panel dimension of our dataset.
[7] Note that Education in Finance, which was an alternative variable of financial education used in Jappelli (2010), was not available to us. The data-set in the present study was downloaded in August 2013 and this particular data item was removed from the database.
[8] We have also experimented with the corruption index, as an additional control variable to deal with the concept of governance. This variable, however, proved to be highly co-linear with both finance skills and PISA scores as well as with financial openness. We have opted therefore, not to include this variable in our specifications.

General economic conditions: We begin by using the growth in *Gross Domestic Product (GDP)*[9]. GDP growth can have both positive and negative impacts on home bias. Countries with fast growing GDP should attract more foreign investments resulting in a decline in the home bias. On the other hand, countries growing faster are mostly the emerging market economies that face higher risk, thus, discouraging foreign investments, resulting in an increase in home bias.

Foreign direct investment (FDI) was employed by Chan et al. (2005) as another measure of economic development. It is measured by foreign direct stock investment inward, scaled by GDP. An increase in FDI should have a negative effect on home bias. This indicator is important as a country's level of economic development is likely to affect the flow of foreign investments in a country.

Information-related variables: Following De Moor and Vanpée (2013), trade and the English language are taken as proxies for information asymmetries and familiarity, respectively. These measures are expected to affect home bias negatively. *Trade* is calculated as the average of exports and imports scaled by GDP. The *English* language is a dummy that takes the value one if the country has English as one of its official languages, and zero otherwise.

Age has an impact on the individuals' investment decisions by affecting their risk preferences and is measured by total population in the age group of 15-64 years. Several researchers used the age factor and concluded that older investors are more experienced, practiced and perceive less risk as compared to the younger ones. Age also affects investors' decision making through risk perception[10]. Hence, age and home bias are positively correlated, which means that as individuals grow older, the level of risk perception decreases (Rana et al., 2011).

Financial liberalisation: Following Mondria and Wu (2010), the *Chinn-Ito Index of financial openness* is used to measure financial liberalisation and financial openness at the country level. Financial market openness provides incentive for investors to hold foreign assets in order to increase gains from diversification. Thus, financial openness of a country is likely to affect home bias negatively. This measure is a combination of four binary dummy variables mentioned in IMF's Annual Report on Exchange Arrangements and Exchange

[9] We also use the log of GDP per capita as a measure of economic development and our results are broadly similar. However, the variable has high correlation with PISA scores, tertiary education and financial openness. Thus, this variable is not included in the main models.

[10] It was demonstrated that older investors are more tolerant towards risk as they have more non-refundable takings which they can invest easily (Rana et al., 2011).

Restrictions (AREAER). The variables include the presence of multiple exchange rates, the existence of restrictions on current account transactions, the existence of restrictions on capital account transactions and the requirement of the surrender of export proceeds. Hence, by structure the Chinn-ito index is a de-jure measure of financial openness[11].

Financial market development: Using domestic credit and turnover ratio, we measure the impact of financial market development on equity home bias. We expect to find a negative relation of these variables with equity home bias. *Market turnover,* which is measured by the turnover ratio, shows an asset's ability to be sold without causing much movement in price and value. Following Levine and Zervos (1996), the turnover ratio helps in measuring market liquidity and transaction costs[12]. According to Bekeart et al. (2007), the effect of liquidity is more distinct in emerging markets where executing transactions are time-consuming.

D*omestic credit* provided by the banking sector, as a percentage of GDP, was used by Rose and Spiegel (2009) and De Moor and Vanpée (2013) to measure the domestic financial depth. This variable includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net[13]. Thus, home bias in a country is likely to decrease with an improvement in country's financial depth and liquidity.

Diversification benefits and financial factors: Following Edison and Warnock (2004), we employ the *current ratio* that signals the ability of firms to meet short-term obligations. This ratio is calculated as current assets over current liabilities. Thus, an increase in current ratio should have a negative impact on home bias as firms which are more liquid are able to attract higher levels of foreign investments, thus reducing the home bias.

In addition, we use *Leverage,* which is calculated as the ratio of total debt to total assets. More indebted companies face a higher degree of information asymmetries and are associated with a weaker financial position. These companies are less likely to attract foreign investors which minimises their diversification benefits and therefore the higher the leverage, the higher the home bias.

Financial factors also tend to have a strong influence in promoting aggregate growth and productivity in a country as they influence firms' real activities (Chen and Guariglia, 2013). There is a strong linkage between financial development on productivity and growth (King

[11] One potential drawback of this index is that investors may find loopholes and thus may escape the capital account restrictions, invalidating the effect of capital account restrictions.

[12] It is shown that assets with lower liquidity, trade at a lower price relative to their expected cash flows. Thus, illiquid assets command a higher risk premium and therefore higher expected returns.

[13] The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available.

and Levine, 1993). Well-developed financial markets help in mobilising funds to profitable channels and hence diversify risks associated with innovative projects.

Foreign exchange risk: Following De Moor and Vanpée (2013), we account for foreign exchange rate risk by creating a dummy (*Euro*), which takes the value one if the country is a member of the Euro-area, and zero otherwise. Baele et al. (2007) found that home bias was lower for the countries that were a part of the European monetary union compared to other countries. Thus, foreign exchange risk is expected to have a positive effect on home bias.

3.2 The impact of financial development

In the next stage, we explore the extent to which an increase in education may have a different impact on the home bias of countries characterised by different degrees of financial development. To do so, we use the degree of stock market capitalization as a sorting device. Stock market capitalisation to gross domestic product (GDP) ratio is an efficient measure of stock market size. Larger stock markets are considered to have higher mobility of capital, less volatility and risk and are more internationally integrated (Demirguc-Kunt and Levine, 1996). Further, investors are attracted towards more developed stock markets due to the fact that they are characterised by lower transaction costs and higher liquidity (Chan et al., 2005). The countries in our sample are classified into more and less financially developed on the basis of the average stock market capitalization normalised by GDP[14]. Therefore, we generate a dummy variable to capture financial development (*Fin.Dev)* which takes the value one if a country's stock market capitalization is greater than the mean and zero otherwise. This means that countries above (below) the mean of stock market capitalization are more (less) financially developed. As the degree of home bias in international portfolios is higher in less financially developed economies, the impact of education and financial sophistication on home bias is expected to be more important in countries with less developed financial markets compared to their more developed counterparts. In order to test this hypothesis, we modify equation (1), by including interactions between education (Edu) and the financial development dummy (*Fin.Dev)*:

$$E\mathcal{HB}_{it} = a_0 + a_1 Edu_{it} * Fin.Dev_{it} + a_2 Edu_{it} * (1 - Fin.Dev_{it}) + a_3 \mathcal{X}_{it} + e_{it}, \qquad (3)$$

The specifications above capture the impact of education on economies with different levels of financial development. If the interacted coefficients are statistically different from each

[14] In the robustness tests section we present results when we employ the ratio of total value of stock traded to gross domestic product as an alternative sorting device for financial development. In addition, we found that our results are upheld when other measures are used such as the mean of stock market capitalization and outstanding domestic private debt securities to gross domestic product (GDP).

other it can be concluded that the impact of education on the home bias is different between more and less financially developed economies.

3.3 Accounting for differences between crisis and non-crisis periods

Having identified a relationship between different facets of education and home bias for more and less financially developed economies, we now explore whether this linkage has evolved over time. Our sample covers the most recent global financial crisis and it provides a natural experiment to investigate the extent to which, controlling for other factors, home bias differs in crisis years compared to more tranquil periods. Therefore, we augment equation (3) with a financial crisis dummy (*Crisis*), which takes the value one over the period 2007-09, and zero otherwise. We then interact the education variable with the *Crisis* and the *Fin.Dev* dummies to examine whether the sensitivity of countries' home bias to changes in the level of education differs between crisis and non-crisis periods for more and less financially developed economies. There is evidence that the most recent financial crisis adversely influenced equity markets in the world. Countries with poor credit market regulations and larger pre-crisis current account deficits were hit the hardest (Giannone et al., 2010 and Lane and Milesi-Ferretti, 2011). The estimated model is described as follows:

$$EHB_{it} = a_0 + a_1 Edu_{it} * Fin.Dev_{it} * crisis_t + a_2 Edu_{it} * (1 - Fin.Dev_{it}) * crisis_t + a_3 Edu_{it} * Fin.Dev_{it} * (1 - crisis_t) + a_4 Edu_{it} * (1 - Fin.Dev_{it}) * (1 - crisis_t) + a_5 X_{it} + e_{it}, \quad (4)$$

If the interaction terms during the crisis are significantly different from the same terms outside of the crisis, then the additional response of the home bias to education during the crisis is detectable compared to tranquil periods.

4. Data and summary statistics

4.1 Data

The data for this paper are drawn from different sources including the Coordinated Portfolio Investment Survey (CPIS), the World Bank, the IMD World Competitiveness Yearbook (WCY), the World Federation of Exchanges (WFE) and the DataStream. These are combined in a new way to cast light on the effect of education on international diversification in equity portfolios. The data covers 38 countries over the period of 2001 to 2010[15].

[15] Due to missing information in the CPIS dataset for India and Mexico, the home bias data for these countries begin in 2003.

4.1.1 Home bias measure

Portfolio holdings data for constructing the equity home bias measure are taken from Coordinated Portfolio Investment Survey (CPIS) held by the IMF. This survey contains comparable multi-country data at the security level from end-investors, custodians and a combination of the above. Portfolio investment is broken down by instrument (equity) and residence of issuer[16]. The equity market capitalisation data are from the World Federation of Exchanges (WFE).

4.1.2 Education

In our study, we measure education using traditional indicators such as tertiary school enrolment rates, mathematical literacy and finance skills[17]. Tertiary enrolment rates are drawn from the World Development Indicator (WDI) of the World Bank. As an alternative measure of education we employ the PISA maths scores for 15 year old individuals. This is an ideal measure for economic literacy as it provides an assessment of financial knowledge and skills (Jappelli, 2010). This variable can also be a good measure to capture the numerical ability as the propensity to invest is related with numerical ability, verbal fluency and recall skills (Christelis et al., 2010). Finally, this variable allows us to capture financial literacy among the young people, which has been highlighted as an important factor at the beginning of individuals' working life (see Jappelli, 2010 and Lusardi and Mitchell, 2013). In addition to these variables, we use an indicator of finance skills drawn from the IMD World Competiveness Yearbook (WCY). This indicator is based on a survey conducted on senior business managers who represent a cross-section of the business community in the countries examined. The survey tries to answer questions related to efficiency and ability of managers to adapt towards changing enterprise competitiveness. WCY also reports questions related to value added activities in business, since skilled labour force is able to enhance a country's competitiveness. The distribution and ranking of economies in the survey carried out by WCY is very similar to those provided by the Survey of Health, Assets, Retirement and Expectations (SHARE), which gives information on the cognitive ability at the individual level in 11 European countries (see Jappelli, 2010 and Jappelli and Padula, 2013). Thus, WCY can provide a representative base for conducting our empirical analysis.

---

[16] The CPIS provides the most comprehensive survey of international portfolio investment holdings and has been employed by a number of recent studies (e.g. Fidora et al., 2007; Bekaert and Wang, 2009 and Gianetti and Koskinen, 2010). However, it is still subject to a number of important caveats such as incomplete country coverage (see De Moor and Vanpee, 2013). For general information about the database see http://www.imf.org/external/data.htm#financial

[17] We also employed the secondary school enrolment rates as an additional control variable to check the robustness of our main results and we claim that the impact on equity home bias is mainly driven by formal education, mathematical numeracy and finance skills and not by secondary education.

4.1.3 Other influences

Data on GDP growth, foreign direct investment (FDI), trade and age of individuals are taken from the WDI of the World Bank. Turnover ratio and domestic credit data are also sourced from the WDI of the World Bank. Finally, data on Leverage and current ratio are obtained from the DataStream Global Index. DataStream, which is distributed by Thomson Reuters, is a global financial and macroeconomic database for equities, stock market indices, currencies, company fundamentals and fixed income securities.

4.2 Summary statistics

By way of preliminary analysis we present descriptive statistics for equity home bias in Table 1. We can observe the average home bias for the whole sample takes the value 77.12% for equity portfolios. The statistics also show that in all countries equity portfolios exhibit home bias with the highest average equity home bias observed in Turkey during the period of 2001-2010. On the other hand, the lowest average equity home bias is shown in the United States[18].

Further, columns 2 and 3 of Table 1 present the mean values of home bias for more and less financially developed economies. The final column reports the p-value of a test of whether there is a significant difference between the values for the two groups of economies. We find that home bias is more prevalent in the latter economies. We show that the average equity home bias in the financially developed economies is 68.70%, while that for the less developed economies is 82.13%. Put differently, investors in the less financially developed economies hold less than $1/5^{th}$ of foreign equities that they should be holding according to the basic international CAPM model. This supports the notion put forward by Coeurdacier and Rey (2013) that home bias in equities is likely to be more important in economies with less developed financial markets[19]. In addition, Sercu and Vanpée (2007) point out that emerging market economies have more volatile stock markets and hence display higher equity home bias. They argue that international investors are reluctant to invest in these economies due to higher risk and volatility.

Table 2 reports summary statistics for the country-specific variables used in the regression models. Once again, we report these values for the whole sample (column 1); for more and less financially developed economies (columns 2 and 3); and a p-value for the test

[18] See Table A2 in the appendix for statistics on the home bias across the countries employed in this paper.

[19] Coeurdacier and Rey (2013) show that emerging markets have less diversification in their equity portfolios than developed economies and do not display any downward trend in home bias.

of equality of means (column 4). To begin with the measures of education[20], we show that all measures of education are significantly higher for the developed group, as expected. This statistic lends support to Jappelli (2010), who argues that economic literacy is generally lower in less advantaged demographic groups.

Variables reflecting economic health such as GDP growth and FDI display significantly different values for the two groups of countries. Specifically, less financially developed economies are growing faster compared to their more developed counterparts, while the level of FDI is higher for the more developed group as opposed to the less developed group. With respect to information-related variables, we observe that trade and the English language have significant differences across the two groups of countries. More financially developed countries have a higher level of trade and most have English as their common language compared to less developed economies. Financial openness is significantly higher for economies with more financially developed markets as opposed to less developed economies. Moving to financial market indicators, we find that turnover ratio and domestic credit are larger for the developed countries and are also significantly different from the less developed group. In addition, while less developed economies display higher current ratios and levels of debts, the differences are not statistically significant. Finally, the mean of the Euro dummy is higher for more financially developed economies and also significantly different from the less developed group.

Taken together, two points can be highlighted from these preliminary statistics. First, equity portfolios are significantly home-biased in our sample. Second, more financially developed economies enjoy an advantageous position in attracting foreign investments, display higher levels of education, stronger economic and financial factors, financial market liberalisation and lower exchange rate risk than less financially developed economies. It remains to be seen, though, whether these preliminary findings continue to hold when we control for a number of factors which are known to play a role in international diversification studies. In the sections that follow we test within a formal regression analysis framework whether education has a statistically significant influence on equity home bias.

5. Results

5.1 Education and home bias in equity portfolios

In this section we shed light on the role played by education in equity portfolios. We begin with tertiary education in column 1 and then add PISA math scores and financial skills

[20] Table A2 also provides the average of different measures of education for 2001-2010 across countries.

in subsequent columns. Estimates of equation (1) are obtained using OLS with time dummies and are presented in Table 3[21]. The point estimates on education suggest a robust relationship between the different measures of education and the home bias for equity portfolios. Education attracts a negative and highly significant coefficient for all the three measures, which enables us to assess the impact of a *ceteris paribus* increase in education on the degree of equity home bias. Our finding suggests that with an increase in education and financial sophistication the level of home bias is reduced. This finding is not only statistically but also economically important, since a one standard deviation increase in tertiary education and finance skills reduces equity home bias by 0.24 and 0.46 standard deviations, respectively. This result is in line with Cole et al. (2012) and Graham et al. (2009), who show that financial market participation increases if the education attained at the school level improves. Importantly, our results also confirm the findings of Karlsson and Nordén (2007) that higher levels of education are associated with lower equity home bias.

Next, we focus on the country-specific control variables used in the models[22]. We find that fast growing countries display a higher level of equity home bias, while *FDI* has an insignificant effect on equity home bias. Countries with higher GDP growth are mainly accompanied by less developed financial markets facing higher levels of equity home bias. Moving to information-related variables, we find that both *Age* and the *English* dummy enter with the expected positive and negative coefficients, respectively. Older investors are likely to be more risk-averse and tend not to participate in foreign investments. Thus, with an increase in the age of investors, the equity home bias is likely to increase. The *English* dummy shows that countries that have English as their official language display lower levels of home bias as they attract more foreign investments (De Moor and Vanpée, 2013). *Trade* enters with a negative and a highly significant coefficient in the equity home bias regression. This suggests that an increase in trade between countries reduces information asymmetries, encouraging capital flows across countries. Thus, we conclude that information-related variables are important determinants of home bias in equity markets.

Financial openness enters with the anticipated negative sign and is significant at the one percent level in all models. This result shows that an increase in a country's financial openness is likely to reduce the equity home bias. This finding is in line with Bekaert and

[21] Results obtained by Seemingly Unrelated Regression (SUR) method are quantitatively similar to the OLS results implying that the error terms are uncorrelated.

[22] Table A3 provides the correlation matrix between all the explanatory variables which show that our variables do not suffer from high correlation.

Wang (2009) and Mondria and Wu (2013). Similarly, a higher *Turnover ratio*, which is typically associated with lower transaction costs, has a negative impact on equity home bias. We also observe a negative and highly statistically significant coefficient for *domestic credit* which is a measure of financial depth. This suggests that an improvement in a country's liquidity and expansion of financial markets helps to attract more foreign investments, resulting in a negative relation with equity home bias.

Both *leverage* and *current ratio* enter with the expected signs but are quantitatively unimportant. Finally, the coefficient on the *Euro dummy* is consistently negative and highly significant. The point estimates indicate that countries within the Euro-area have lower home bias in equity portfolios as shown by De Moor and Vanpée (2013). This result implies that countries with a common currency such as the Eurozone countries experience lower home bias in terms of equities (Baele et al., 2007).

5.2 Accounting for different levels of financial development

Having identified a direct relationship between education and home bias, we now explore whether this link varies for countries with different levels of financial market development. Table 4 presents estimates for the interaction terms between education and *Fin.Dev* and (1-*Fin.Dev*) dummies. The results reveal the heterogeneity between countries that is masked in the estimates for the full sample.

We report results of equity home bias for different measures of education in columns 1-3 of Table 4. The coefficients associated with the interaction terms are negative and significant in all cases. Hence, we find that improving education is likely to decrease the level of home bias for both groups of economies. The magnitude of the interacted coefficients, however, reveals a more interesting story since the point estimates are always significantly higher for the less developed group of economies. Specifically, one standard deviation increase in education reduces the equity home bias in less financially developed economies by around 0.26-0.64 standard deviations, and by only 0.20-0.52 standard deviations in their more developed counterparts.

In other words, we find that those countries which are characterised by less developed financial markets exhibit a higher sensitivity of equity home bias to education. Tests of equality for the education coefficients between the two groups of countries indicate that the null hypothesis of equality can be rejected in all regression models. This is a novel finding which highlights that education has a differentiated effect in determining equity home bias in economies with less developed financial sector. Hence, it suggests that an increase in the level of education and financial sophistication among investors in economies that display a

lower level of equity market development can be a crucial factor in reducing equity home bias. Specifically, an increase in the level of education helps in strengthening the investor's competence that, in turn, encourages the investor to diversify his/her portfolio in terms of foreign investments. This finding also echoes the argument made by Klapper et al. (2013) that financial literacy should not be taken as given in economies with developing financial markets. Lastly, with respect to the other control variables in the model, they retain their significance in most cases and behave as conjectured.

5.3 The effect of the most recent financial crisis

Our sample spans the most recent global financial crisis and as such it provides a natural experiment to explore the impact of the crisis on portfolio diversification. We address the response to the crisis by examining the sensitivity of home bias to education in the 2007–2009 financial crisis. We report coefficients on variables interacted with the dummy variables *Crisis* and $(1 - Crisis)$ along with the dummies (*Fin.Dev*) and (1-*Fin.Dev*).

The results reported in Table 5 show the impact of the equity home bias in more and less financially developed economies during crisis and non-crisis periods. To begin with, the coefficients on the interaction terms are negative and precisely determined in all cases but they are significantly higher for less financially developed economies in both crisis and non-crisis periods. The results imply that education plays a more important role in reducing the equity home bias in economies with lower levels of equity market development during the crisis and non-crisis periods compared to more financially advanced economies.

In terms of economic significance, the elasticities imply important differences. In particular, during the crisis period, a one standard deviation increase of education reduces the equity home bias by around 0.29-0.73 standard deviations in less developed economies and by 0.20-0.58 in their more developed counterparts. In tranquil periods, the equity home bias can be reduced by around 0.25-0.62 standard deviations and by 0.20-0.50 standard deviations in more and less financially developed countries, respectively. The test of equality of the coefficients, which is reported at the foot of the Table, shows a statistically significant difference in the coefficients of education during the crisis for both more and less financially developed economies. Similarly, in most of the cases there is a significant difference in the coefficient values of financial education during non-crisis periods for both economies which are more and less financially developed.

In summary, the greater sensitivities of equity home bias to changes in the level of education are documented for economies which exhibit lower levels of financial development

during the crisis than outside. According to Eichengreen et al. (2006), during adverse economic events foreign investors tend to escape emerging markets because these are characterised by lower liquidity, higher volatility and domestic risk. This finding was also noted in Mizen and Tsoukas (2012), who documented a substantial increase in the bond market external finance premium for the emerging Asian markets. This results in lower levels of foreign investments and higher degree of home bias in emerging markets. Thus, our finding suggests that improving the level of education, especially in less developed economies, could be one important factor in ameliorating the adverse effects of financial crises with respect to international diversification.

6. Robustness tests

6.1 Addressing endogeneity concerns

While the results reported in the previous sections are robust to different measures of education, we may still encounter endogeneity bias. We therefore use an instrumental variables technique (two-stage least squares 2SLS) to combat the potential endogeneity of our explanatory variables[23]. The identification of the impact of education requires the availability of exogenous instruments that are correlated with education, but do not directly affect the degree of home bias in international portfolios. We propose that the internet usage can provide a plausible exogenous source of variation in the level of education. This variable, which is time varying, measures a country's information capacity (see Mondria and Wu, 2010). Internet connection allows the agents to access the information which is freely available in the outside world and thus, enhances knowledge and skills of agents. It became popular from the late 1990's and as our model considers a time-period of 2001-2010, the use of this variable is highly justified with full availability of data for all countries in almost every year of our sample[24]. In addition, we argue that while internet usage is correlated with education, it does not impact the degree of diversification directly.

We also assume that all the other control variables used in the model are possibly endogenous. Thus, we instrument for these variables using own values lagged twice. We check the relevance and validity of the instruments used for education as well as for our control variables employing a number of tests. All the tests are reported at the foot of the tables.

[23] Results obtained by three-stage least squares (3SLS) method are quantitatively similar to 2SLS. The 3SLS are consistent and more efficient than 2SLS asymptotically, but the results of the former method reduce to 2SLS if the disturbance terms are uncorrelated.

[24] The data for internet users are taken from the WDI World Bank database.

Tables 6, 7 and 8 report the results for the three models, respectively. Table 6 presents results for the baseline model; Table 7 shows the interaction between more and less financially developed economies, and Table 8 reports the results for the interactions between the crisis/non-crisis periods. Overall, our results are upheld. Starting with Table 6, we are able to confirm our main findings since we show that education is negatively related with equity home bias. Moreover, in Table 7 we continue to observe that education has a significantly higher impact on less financially developed economies compared to their more developed counterparts. Finally, in Table 8, education plays a more important role in reducing equity home bias during the crisis and non-crisis period for less financially developed economies than for more developed economies. Finally, the diagnostics do not indicate any problems regarding the choice and the relevance of our instruments. In sum, we conclude that our findings are robust to endogenous regressors[25].

6.2 An alternative measure of home bias

Next, we modify the measure of equity home bias in the spirit of Bekaert and Wang (2009). The authors argue that there is a size bias in the previous measure of home bias shown in equation (2) and hence large markets might display lower levels of home bias. To solve this potential problem of size bias, Bekaert and Wang (2009) scale the home bias measure in equation (2) by the maximum home bias:

$$\overline{\mathcal{HB}}_{it} = \frac{\mathcal{HB}_{it}}{(1-\frac{\mathcal{M}_{it}}{\mathcal{W}})},$$

where $\mathcal{HB}_{it}$ is the home bias measure in equation (2), $\mathcal{M}_{it}$ is the market capitalisation of country i for time period t, $\mathcal{W}$ is the world market capitalisation.

Table 9 presents the results for the baseline model using the scaled equity home bias measure. The results are similar both quantitatively and qualitatively with those shown in section 5.1, which demonstrates the robustness of the baseline model. Table 10 takes into account the differences between more and less financially developed economies and the results indicate that education reduces scaled equity home bias in less financially developed economies significantly compared to more financially developed economies. Table 11 shows that during crisis and non-crisis periods education is more sensitive in reducing scaled equity home bias in less financially developed economies compared to economies with more

[25] In addition to the statistics reported at the tables of results, we also employed the Anderson Rubin chi-square test and obtained identical p-values as with Anderson Rubin F-test.

developed financial markets. To sum up, we conclude that our results are robust to an alternative measure of home bias.

6.3 An alternative measure of financial development

In our main empirical results we used the average stock market capitalisation as a sorting device for more and less developed economies. In order to ensure that our results are not driven from the way that we divide our sample, we use a robust framework in order to achieve a good measure of financial development. In particular, we classify our countries into more and less financially developed using the mean of total value of stock traded to gross domestic product (GDP) ratio[26]. We construct a dummy variable (*Fin.Dev2)* which takes the value one for more developed economies and zero otherwise. We then re-estimate the models from Tables 4 and 5 and report the results in Tables 12 and 13.

The results in Table 12 confirm that an increase in education reduces equity home bias more in less developed economies compared to more developed countries. Once again in Table 13, we show that education reduces equity home bias in less developed economies compared to their more developed counterparts, during both crisis and non-crisis periods. Hence, we conclude that our main empirical results are robust to an alternative definition of financial development.

7. Conclusion

A number of studies published recently have identified that education matters in affecting the process of financial decision making. We ask whether education makes countries more likely to display a lower degree of home bias. We then take into account country-level heterogeneity and explore the above link when a crisis occurs. Credit availability has been widely cited as a constraint to expansion in Western countries during the recent crisis, but lower levels of education and habitual reliance on domestic portfolios could explain why home bias has remained at elevated levels through the early stages of the financial crisis.

This paper examines the impact of education on home bias in equity portfolios. Our results, based on a panel of economies that exhibit substantial heterogeneity in financial development during the period of 2001–2010, suggest that education plays a crucial role in the reduction of home bias in equity holdings. After separating countries into more and less developed groups, using the average stock market capitalization, we find that less developed

[26] This variable has been employed in a number of recent studies such as Chinn and Ito (2006), Aizenman and Pasricha (2011) and Čihák et al. (2013) as a measure of financial development. The data for total value of stock traded to GDP are drawn from the World Bank.

countries tend to benefit more from an improvement in the level of education compared to their more developed counterparts. We also find that less financially developed economies were more sensitive to the level of education during the global financial crisis than the more developed economies.

Our results are also policy relevant. The results presented in this paper suggest that maintaining high levels of education and financial literacy would substantially increase international portfolio diversification. Hence, embedding financial education in a curriculum should be high on a policymaker's agenda, especially for emerging market economies.

References

Adler, M., Dumas, B., 1983. International Portfolio Choice and Corporation Finance: A Synthesis, *Journal of Finance* 38(3), pp. 925-984.

Agnew, J., Szykman, L., 2005. Asset Allocation and Information Overload: The Influence of Information Display, Asset Choice and Investor Experience, *Journal of Behavioral Finance* 6, pp. 57–70.

Ahearne, A., Grivier, W., Warnock, F., 2004. Information Costs and Home Bias: An Analysis of US Holdings of Foreign Equities, *Journal of International Economics* 62, pp. 313-336.

Aizenman, J., Pasricha, G. K., 2012. Determinants of Financial Stress and Recovery during the Great Recession, *International Journal of Finance and Economics* 17(4), pp. 347–372.

Baele, L., Pungulescu, C., Horst, J. T., 2007. Model Uncertainty, Financial Market Integration and the Home Bias Puzzle, *Journal of International Money and Finance* 26(4), pp. 606-630.

Banks, J., Oldfield, Z., 2007. Understanding Pensions: Cognitive Function, Numeracy and Retirement Saving, *Fiscal Studies* 28, pp. 143-170.

Barro, R., iMartin, X. S., 1995. *Economic Growth*, 1 ed. New York: McGraw-Hill.

Bekaert, G., Harvey, C. R., Lundblad, C., 2001. Emerging Equity Markets and Economic Development, *Journal of Development Economics* 66(2), pp. 465-504.

Bekaert, G., Harvey, C. R., Lundblad, C., Siegel, S., 2007. Global Growth Opportunities and Market Integration, *Journal of Finance* 62, pp. 1081-831.

Bekaert, G., Wang, X., 2009. Home Bias Revisited. Mimeo, Columbia Business School.

Bernheim, D., 1995. Do Households Appreciate Their Financial Vulnerabilities? An Analysis of Actions, Perceptions, and Public Policy, *Tax Policy and Economic Growth*, Washington, DC: American Council for Capital Formation, pp. 1–30.

Bernheim, D., 1998. Financial Illiteracy, Education and Retirement Saving, in Olivia S. Mitchell and Sylvester Schieber (eds.), *Living with Defined Contribution Pensions*, Philadelphia: University of Pennsylvania Press, pp. 38–68.

Bernheim, D., Garrett, D., 2003. The Effects of Financial Education in the Workplace: Evidence from a Survey of Households, *Journal of Public Economics* 87, pp. 1487–1519.

Burger, J., Warnock, F., 2003. Diversification, Original Sin, and International Bond Portfolios, *International Finance Discussion Paper* 755, Board of Governors of the Federal Reserve System.

Burger, J., and Warnock, F., 2006. Local Currency Bond Markets, *IMF Staff Papers* 53, pp. 133-146.

Campbell, J., 2006. Household Finance, *Journal of Finance* 61, pp. 1553–1604.

Chan, K., Covrig, V., Ng, L., 2005. What Determines the Domestic Bias and Foreign Bias? Evidence from Mutual Fund Equity Allocations Worldwide, *Journal of Finance* 60, pp. 1495-1534.

Chen, M., Guariglia, A., 2013. Internal financial Constraints and firm Productivity in China: Do Liquidity and Export Behavior Make a Difference?, *Journal of Comparative Economics* 41, pp. 1123–1140.

Chinn, M. D., Ito, H., 2006. What Matters for Financial Development? Capital Controls, Institutions, and Interactions, *Journal of Development Economics* 81(1), pp. 163-192.

Christelis, D., Jappelli, T., Padula, M., 2010. Cognitive Abilities and Portfolio Choice, *European Economic Review* 54, pp. 18-39.

Čihák, M., Demirgüč-Kunt, A., Feyen, E., Levine, R., 2013. Financial Development in 205 Economies, 1960 to 2010, *Journal of Financial Perspectives* 1(2), pp. 17-36.

Coeurdacier, N., Rey, H., 2013. Home bias in Open Economy Financial Macroeconomics, *Journal of Economic Literature*, American Economic Association 51(1), pp. 63-115.

Cole, S., Sampson, T., Zia, B., 2011. Prices or Knowledge? What Drives Demand for Financial Services in Emerging Markets?, *Journal Of Finance*, Vol. LXVI, No. 6.

Cole, S. A., Paulson, A. L., Shastry, G. K., 2012. Smart Money: The Effect of Education on Financial Behavior, *Harvard Business School Finance Working Chapter* No. 09-071.

Cooper, I. A., Kaplanis, E., 1994. Home Bias in Equity Portfolios, Inflation Hedging and International Capital Market Equilibrium, *Review of Financial Studies* 7(1), pp. 45-60.

Coval, J., Moskowitz, T., 1999. Home Bias at Home: Local Equity Preference in Domestic Portfolios, *Journal of Finance* 54, pp. 2045-2073.

De Moor, L., Vanpée, R., 2013. What Drives International Equity and Bond Holdings? An Empirical Study, *Applied Financial Economics* 23(13), pp. 1067-1082.

Demirguc-Kunt, A., Levine, R., 1996. Stock Market Development and Financial Intermediaries: Stylized Facts, *World Bank Economic Review*, World Bank Group 10(2), pp. 291-321.

Driessen, J., Laeven, L., 2007. International Portfolio Diversification Benefits: Cross-Country Evidence from a Local Perspective, *Journal of Banking & Finance* 31, pp. 1693–1712.

Edison, H. J., Warnock, F. E., 2004. US Investors' Emerging Market Equity Portfolios: A Security-Level Analysis, *The Review of Economics and Statistics* 86(3), pp. 691-704.

Eichengreen, B., Borensztein, E., Panizza, U., 2006. A Tale of Two Markets: Bond Market Development in East Asia and Latin America, *Hong Kong Institute for Monetary Research*, Occasional Paper No. 3.

Fellner, G., Maciejovsky, B., 2003. The Equity Home Bias: Contrasting an Institutional with a Behavioural Explanation, *Max Planck Discussion Paper* No 3-2003.

Fidora, M., Fratzscher, M., Thimann, C., 2007. Home Bias in Global Bond and Equity Markets: The Role of Real Exchange Rate Volatility, *Journal of International Money and Finance* 26(4), pp. 222-225.

French, K., Poterba, J., 1991. Investor Diversification and International Equity Markets, *American Economic Review* 81, pp. 222–226.

Gelos R. G., Wei, S-J, 2005. Transparency and International Portfolio Holdings, *Journal of Finance* 60(6), pp. 2987-3020.

Gerardi, K., Goette, L., Meier, S., 2010. Financial Literacy and Subprime Mortgage Delinquency: Evidence from a Survey Matched to Administrative Data, *Federal Reserve Bank of Atlanta Working Papers*, No. 2010-10.

Giannetti, M., Koskinen, Y., 2010. Investor Protection, Equity Returns, and Financial Globalization, *Journal of Financial and Quantitative Analysis* 45(1), pp. 135-168.

Giannone, D., Lenza, M., Reichlin, L., 2010. Market Freedom and the Global Recession, *ECARES Working Paper* 2010-020.

Giofre, M., 2012. Financial Education, Investor Protection and International Portfolio Diversification, *Netspar Discussion Chapter* No. 04/2012-021.

Graham, J. R., Harvey, C. R., Huang, H., 2009. Investor Competence, Trading Frequency, and Home Bias, *Management Science* 55(7), pp. 1094-1106.

Guariglia, A., Poncet, S., 2008. Could Financial Distortions Be No Impediment To Economic Growth After All? Evidence from China, *Journal of Comparative Economics* 36, pp. 633–657.

Guiso, L., Jappelli, T., 2005. Awareness and Stock Market Participation, *Review of Finance* 9, pp. 537-567.

Guiso, L., Jappelli, T., 2008. Financial Literacy and Portfolio Diversification, *CSEF Working Chapter* 212.

Harvey, C. R., 1995. Predictable Risk and Returns in Emerging Markets, *Review of Financial Studies* 8, pp. 773–816.

Heath, C., Tversky, A., 1991. Preferences and Beliefs: Ambiguity and the Competence in Choice Under Uncertainty, *Journal of Risk and Uncertainty* 4, pp. 5-28.

Hilgert, M., Hogarth, J., Beverly, S., 2003. Household Financial Management: The Connection between Knowledge and Behavior, *Federal Reserve Bulletin*, pp. 309–322.

Jappelli, T., 2010. Economic Literacy: An International Comparison, *The Economic Journal* 120(548), pp. F429-F451.

Jappelli, T., Padula, M., 2013. Investment in Financial Literacy and Saving Decisions, *Journal of Banking and Finance* 37(8), pp. 2779-2792.

Kang, J., Stulz, R. M., 1997. Why is there a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan, *Journal of Financial Economics* 46, pp. 3-28.

Karlsson, A., Nordén, L., 2007. Home Sweet Home: Home Bias and International Diversification among Individual Investors, *Journal of Banking and Finance* 31, pp. 317-333.

Karolyi, A., Stulz, R., 2003. Are Financial Assets Priced Locally or Globally?, in the *Handbook of the Economics of Finance*, G. Constantinides, M. Harris, and R.M. Stulz, eds. Elsevier North Holland.

Kennickell, A. B., Kwast, M. L., Starr-McCluer, M., 1996. Household's Deposit Insurance Coverage: Evidence and Analysis of Potential Reforms, *Journal of Money, Credit, and Banking* 28, pp. 311–322.

Kilka, M., Weber, M., 2000. Home Bias in International Stock Return Expectation, *Journal of Psychology and Financial Markets* 1, pp. 176-192.

Kimball, M., Shumway, T., 2010. Investor Sophistication, and the Participation, Home Bias, Diversification, and Employer Stock Puzzles. Mimeo, University of Michigan.

King, R. G., Levine, R., 1993. Finance, Entrepreneurship and Growth: Theory and Evidence, *Journal of Monetary Economics* 32, pp. 513–542.

Klapper, L. F., Lusardi, A., Panos, G. A., 2013. Financial Literacy and the Financial Crisis, *Journal of Banking and Finance* 37, pp. 3904-3923.

Lane, P. R., Milesi-Ferretti, G. M., 2011. The Cross-Country Incidence of the Global Crisis, *IMF Economic Review* 59(1), 77-110.

Levine, R., Zervos, S., 1996. Stock Market Development and Long-Run Growth, *World Bank Economic Review* 10, pp. 323-339.

Lewis, K., 1999. Trying to Explain Home Bias in Equities and Consumption, *Journal of Economic Literature* 37, pp. 571-608.

Lusardi, A., 2008. Household Saving Behavior: The Role of Financial Literacy, Information, and Financial Education Programs, *NBER Working Paper* No. 13824.

Lusardi, A., Mitchell, O., 2006. Financial Literacy and Planning: Implications for Retirement Wellbeing, *Pension Research Council Working Chapter* 1, The Wharton School.

Lusardi, A., Mitchell, O. S., 2007. Financial Literacy and Retirement Planning: New Evidence from the Rand American Life Panel, *Center for Financial Studies (CFS) Working Chapter* No. 2007/33.

Lusardi, A., Micthell, O., 2013. The Economic Importance of Financial Literacy: Theory and Evidence, *NBER Working Paper* No. 18952.

Lusardi, A., Tufano, P., 2009. Debt Literacy, Financial Experiences and Overindebtedness, *Center for Research on Pensions and Welfare Policies,* Working Paper No. 83.

Magi, A., 2009. Portfolio Choice, Behavioral Preferences and Equity Home Bias, *Quarterly Review of Economics and Finance* 49 (2), pp. 501-520.

Arghyrou, M. G., Kontonikas, A., 2012. The EMU Sovereign-debt Crisis: Fundamentals, Expectations and Contagion, *Journal of International Financial Markets, Institutions and Money* 22(4), pp. 658-677.

Milesi-Ferretti, G. M., Tille, C., 2011. The Great Retrenchment: International Capital Flows during the Global Financial Crisis, Working Papers 382011, *Hong Kong Institute for Monetary Research.*

Mishra, A., 2011. Australia's Equity Home Bias and Real Exchange Rate Volatility, *Review of Quantitative Finance and Accounting* 37(2), pp. 223-244.

Mizen, P., Packer, F., Remolona, E., Tsoukas, S., 2012. Why do firms issue abroad? Lessons from onshore and offshore corporate bond finance in Asian emerging markets, *Bank for International Settlements,* Working Paper 401.

Mizen, P., Tsoukas, S., 2012. The Response of the External Finance Premium in Asian Corporate Bond Markets to Financial Characteristics, Financial Constraints and Two Financial Crisis, *Journal of Banking and Finance* 36(11), pp. 3048-3059.

Mondria, J., Wu, T., 2010. The Puzzling Evolution of the Home Bias, Information Processing and Financial Openness, *Journal of Economic Dynamics and Control* 34(5), pp. 875-896.

Mondria, J., Wu, T., 2013. Imperfect Financial Integration and Asymmetric Information: competing explanations of the home bias puzzle?, *Canadian Journal of Economics* 46(1), pp. 310-337.

Organization for Economic Co-Operation and Development (OECD), 2005. *Improving Financial Literacy: Analysis of Issues and Policies*. Paris, France: OECD.

Puri, M., Robinson, D. T., 2007. Optimism and Economic Choice, *Journal of Financial Economics* 86, pp. 71-99.

Raddatz, C., Schmukler, S., 2012. On the International Transmission of Shocks: Micro-evidence from Mutual Fund Portfolios, *Journal of International Economics* 88(2), pp. 357-374.

Rana, H. M., Murtaza, S., Noor, F., Inam-ud-din, Rehman, K., 2011. Effects of Demographic Factors on Risky Decision-Making Behavior, *European Journal of Social Sciences* 26(1), pp. 69-76.

Rose, A. K., Spiegel, M. M., 2009. International Financial Remoteness and Macroeconomic Volatility, *Journal of Development Economics* 89, pp. 250-257.

Rowland, P. F., Tesar, L. L., 2004. Multinationals and the Gains from International Diversification, *Review of Economic Dynamics* 7, pp. 789–826.

Sercu, P., Vanpée, R., 2007. Home Bias in International Equity Portfolios: A Review, Katholieke Universiteit Leuven, Faculty of Economics and Applied Economics, *AFI* 0710.

Sercu, P., Vanpée, R., 2012. The Home Bias Puzzle in Equity Portfolios, In H. K. Baker & L. A. Riddick (Eds.), *Survey of International Finance*, Oxford University Press.

Solnik, B., 1974. Why Not Diversify Internationally rather than Domestically?, *Financial Analysts Journal* 30(4), pp. 48-52+54.

Stango, V., Zinman, J., 2009. Exponential Growth Bias and Household Finance, *Journal of Finance* 64, pp. 2807–2849.

Stulz, R. M., 1981. On the Effects of Barriers to International Investment, *Journal of Finance* 36(4), pp. 923-934.

Tesar, L., Werner, I., 1995. Home Bias and High Turnover, *Journal of International Money and Finance* 14, pp. 467–492.

Van Rooij, M., Lusardi, A., Alessie, R., 2011. Financial Literacy and Stock Market Participation, *Journal of Financial Economics* 101(2), pp. 449–472.

Table 1: Distribution of the equity home bias over 2001-2010

	(1) **Whole sample**	(2) **Fin.Dev**	(3) **(1-Fin.Dev)**	(4) **p-value**
Average equity home bias (%)	77.12 (21.10)	68.70 (18.44)	82.13 (21.03)	0.000

Notes: The Table presents sample means with standard deviations in parentheses. The p-value of a test of equality of means is reported. Fin.Dev is a dummy which takes the value one if a country's stock market capitalization is higher than the average, and zero otherwise.

Table 2: Summary statistics for the explanatory variables

Variables	(1) **Whole sample**	(2) **Fin.Dev**	(3) **(1-Fin.Dev)**	(4) **p-value**
Tertiary education	55.38 (20.96)	60.87 (16.55)	52.05 (22.63)	0.000
PISA math score	480.34 (51.25)	506.55 (34.60)	464.17 (52.81)	0.000
Financial skills	65.51 (10.35)	71.82 (7.85)	61.67 (9.80)	0.000
GDP growth	2.91 (3.43)	2.37 (2.71)	3.22 (3.76)	0.019
FDI	3.96 (6.18)	4.97 (6.09)	3.37 (6.17)	0.015
Trade	82.30 (60.43)	96.62 (86.36)	73.94 (35.55)	0.000
Age	66.53 (2.93)	66.72 (2.65)	66.42 (3.08)	0.323
English language	0.18 (0.39)	0.29 (0.45)	0.13 (0.33)	0.000
Financial openness	1.42 (1.31)	2.12 (0.74)	1.01 (1.40)	0.000
Turnover ratio	82.18 (61.27)	106.50 (62.60)	67.82 (55.81)	0.000
Domestic credit	107.43 (62.80)	151.10 (64.01)	81.72 (45.58)	0.000
Current ratio	4.23 (16.73)	4.12 (15.41)	4.30 (17.53)	0.922
Leverage	36.43 (8.64)	35.55 (8.20)	36.96 (8.88)	0.129
Euro dummy	0.24 (0.46)	0.29 (0.45)	0.21 (0.41)	0.087

Notes: The Table presents sample means with standard deviations in parentheses. The p-value of a test equality of means is reported.

Table 3: Baseline model for the equity home bias

	EHB_{it} = Equity home bias		
	(1) Tertiary education	(2) PISA	(3) Financial skills
Education	-0.243***	-0.139***	-0.463***
	(-6.13)	(-6.49)	(-7.42)
GDP growth	1.306***	0.606	1.079***
	(3.95)	(1.21)	(3.22)
FDI	-0.099	0.028	-0.084
	(-0.75)	(0.24)	(-0.66)
Trade	-0.027**	-0.039**	0.018
	(-2.01)	(-2.13)	(1.53)
Age	0.945***	2.967***	0.154
	(3.38)	(5.96)	(0.59)
English dummy	-7.537***	-8.109***	-3.669**
	(-4.57)	(-3.02)	(-2.18)
Financial openness	-5.409***	-4.126***	-6.973***
	(-8.50)	(-4.36)	(-11.09)
Turnover ratio	-0.022	-0.026*	-0.036***
	(-1.65)	(-1.80)	(-3.00)
Domestic credit	-0.052***	-0.024	-0.043***
	(-3.07)	(-1.05)	(-2.64)
Current ratio	0.003	-0.027	0.000
	(0.15)	(-1.48)	(0.01)
Leverage	0.114	0.013	0.136
	(0.90)	(0.08)	(1.07)
Euro dummy	-11.383***	-10.134***	-10.108***
	(-4.63)	(-3.72)	(-4.38)
Constant	43.232**	-41.655	111.473***
	(2.22)	(-1.39)	(5.79)
N	345	244	349
R^2	0.65	0.67	0.66

Notes: Robust t-statistics are reported in the parentheses. Statistical significance is denoted at 1% (***), 5% (**) and 10% (*).

Table 4: Accounting for different levels of financial development

	EHB_{it} = Equity home bias		
	(1) Tertiary education	(2) PISA	(3) Financial skills
Edu*(Fin.Dev)	-0.204***	-0.136***	-0.518***
	(-5.15)	(-6.39)	(-8.45)
Edu*(1-Fin.Dev)	-0.261***	-0.148***	-0.642***
	(-6.09)	(-6.73)	(-9.21)
GDP growth	1.272***	0.301	0.926***
	(3.82)	(0.59)	(2.76)
FDI	-0.116	0.012	-0.089
	(-0.87)	(0.12)	(-0.74)
Trade	-0.028**	-0.041**	0.014
	(-2.09)	(-2.36)	(1.26)
Age	1.084***	3.207***	0.277
	(3.69)	(6.52)	(1.06)
English dummy	-8.073***	-9.359***	-3.195**
	(-4.87)	(-3.53)	(-1.98)
Financial openness	-5.695***	-4.724***	-7.835***
	(-8.51)	(-4.83)	(-12.13)
Turnover ratio	-0.030**	-0.038***	-0.048***
	(-2.25)	(-2.71)	(-4.05)
Domestic credit	-0.059***	-0.039*	-0.063***
	(-3.56)	(-1.72)	(-3.95)
Current ratio	0.008	-0.023	0.011
	(0.39)	(-1.23)	(0.45)
Leverage	0.139	0.066	0.211*
	(1.10)	(0.40)	(1.68)
Euro dummy	-11.413***	-10.339***	-9.279***
	(-4.67)	(-3.81)	(-4.24)
Constant	34.633*	-54.259*	112.810***
	(1.70)	(-1.84)	(5.92)
N	345	244	349
R^2	0.66	0.68	0.69
Test of equality (p. value): Edu	0.042	0.003	0.000

*Notes: Robust t-statistics are reported in the parentheses. The p-value refers to the test of equality between Edu*Fin.Dev and Edu*(1-Fin.Dev). Statistical significance is denoted at 1% (***), 5% (**) and 10% (*).*

Table 5: The role of the recent financial crisis

	EHB_{it} = Equity home bias		
	(1)	(2)	(3)
	Tertiary education	PISA	Financial skills
Edu*Crisis*Fin.Dev	-0.203***	-0.140***	-0.581***
	(-3.21)	(-4.89)	(-4.26)
Edu*Crisis*(1-Fin.Dev)	-0.290***	-0.158***	-0.734***
	(-4.33)	(-5.23)	(-4.40)
Edu*(1-Crisis)*Fin.Dev	-0.203***	-0.132***	-0.499***
	(-4.54)	(-5.75)	(-7.39)
Edu*(1-Crisis)*(1-Fin.Dev)	-0.246***	-0.141***	-0.615***
	(-4.98)	(-5.89)	(-8.02)
GDP growth	1.262***	0.277	0.932***
	(3.79)	(0.54)	(2.75)
FDI	-0.108	0.023	-0.079
	(-0.80)	(0.22)	(-0.66)
Trade	-0.029**	-0.043**	0.013
	(-2.13)	(-2.43)	(1.19)
Age	1.096***	3.245***	0.290
	(3.70)	(6.56)	(1.11)
English dummy	-8.082***	-9.333***	-3.171**
	(-4.89)	(-3.54)	(-1.97)
Financial openness	-5.746***	-4.845***	-7.864***
	(-8.58)	(-4.93)	(-12.13)
Turnover ratio	-0.031**	-0.041***	-0.049***
	(-2.29)	(-2.76)	(-4.05)
Domestic credit	-0.059***	-0.038	-0.062***
	(-3.50)	(-1.64)	(-3.87)
Current ratio	0.009	-0.021	0.011
	(0.42)	(-1.08)	(0.43)
Leverage	0.136	0.061	0.211*
	(1.08)	(0.37)	(1.68)
Euro dummy	-11.381***	-10.144***	-9.179***
	(-4.64)	(-3.76)	(-4.17)
Constant	33.614	-51.436*	110.416***
	(1.64)	(-1.68)	(5.74)
N	345	244	349
R^2	0.66	0.69	0.69
Test of equality (p. value):			
Edu*Crisis	0.063	0.008	0.001
Edu*(1-Crisis)	0.190	0.060	0.000
Edu*Fin.Dev	0.990	0.766	0.587
Edu*(1-Fin.Dev)	0.562	0.565	0.519

*Notes: Robust t-statistics are reported in the parentheses. The p. values refer to the estimated coefficients on Edu*Crisis, Edu*(1-Crisis), Edu*Fin.Dev and Edu*(1-Fin.Dev) for different measures of education. Statistical significance is denoted at 1% (***), 5% (**) and 10% (*).*

Table 6: Robustness: IV regressions for the baseline model

	EHB_{it} = Equity home bias		
	(1) Tertiary education	(2) PISA	(3) Financial skills
Education	-0.779***	-0.325***	-2.069***
	(-8.81)	(-5.66)	(-6.05)
GDP growth	0.815	-1.946	0.999
	(1.15)	(-0.79)	(1.10)
FDI	-0.555	0.967	0.016
	(-1.05)	(1.06)	(0.02)
Trade	-0.045	-0.127*	0.108**
	(-1.55)	(-1.67)	(2.41)
Age	2.303***	8.095***	-2.341***
	(5.18)	(3.13)	(-3.01)
English dummy	-6.982***	-54.148**	1.181
	(-2.75)	(-2.57)	(0.37)
Financial openness	-2.151*	4.364	-4.446***
	(-1.73)	(1.03)	(-2.67)
Turnover ratio	0.025	0.016	-0.000
	(1.08)	(0.35)	(-0.01)
Domestic credit	-0.071***	0.038	-0.029
	(-2.81)	(1.15)	(-1.24)
Current ratio	-0.065**	-0.114	-0.072
	(-2.03)	(-1.61)	(-1.63)
Leverage	0.080	-0.221	-0.105
	(0.38)	(-0.93)	(-0.53)
Euro dummy	-8.188**	-33.066**	-9.082***
	(-2.54)	(-2.26)	(-2.85)
Constant	-20.473	-293.292*	380.066***
	(-0.71)	(-1.80)	(5.50)
N	334	239	338
R^2	0.49	0.04	0.25
Test of equality (p. value): Edu			
Kleibergen-Paap	0.034	0.089	0.033
Anderson-Rubin	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000
Hansen J	0.210	0.628	0.275

Notes: Robust z-statistics for IV (2SLS) regressions are reported in the parenthesis. Statistical significance is denoted at 1% (***), 5% (**) and 10% (*).The Kleibergen-Paap is a test of under-identification, distributed as chi-square under the null of under-identification. The Anderson Rubin and Stock-Wright LM S statistic are weak-instrument-robust inference tests, which are distributed as F-test and chi-square respectively, under the null that coefficients of the endogenous regressors in the structural equation are jointly equal to zero, and the over-identifying restrictions are valid. Hansen J statistic is a test of the over-identifying restrictions, distributed as chi-square under the null of instrument validity.

Table 7: Robustness: IV regressions for different levels of financial development

	EHB_{it} = Equity home bias		
	(1) Tertiary education	(2) PISA	(3) Financial skills
Edu*(Fin.Dev)	-0.553***	-0.332***	-2.084***
	(-4.31)	(-5.05)	(-5.28)
Edu*(1-Fin.Dev)	-0.664***	-0.362***	-2.391***
	(-6.25)	(-5.17)	(-5.53)
GDP growth	0.500	-5.156	0.832
	(0.80)	(-1.37)	(0.84)
FDI	0.205	0.984	-0.071
	(0.92)	(1.06)	(-0.21)
Trade	-0.092***	-0.085	0.092***
	(-4.21)	(-1.16)	(2.78)
Age	2.869***	7.569***	-1.804**
	(5.13)	(2.73)	(-2.41)
English dummy	-9.031***	-60.013**	1.271
	(-3.36)	(-2.41)	(0.35)
Financial openness	-3.039**	0.284	-5.405***
	(-2.19)	(0.06)	(-3.02)
Turnover ratio	-0.030	-0.007	-0.017
	(-0.61)	(-0.12)	(-0.67)
Domestic credit	-0.124**	-0.009	-0.118**
	(-2.55)	(-0.20)	(-1.99)
Current ratio	0.000	-0.270	-0.058
	(0.01)	(-1.32)	(-1.23)
Leverage	0.216	-0.133	0.200
	(1.47)	(-0.54)	(0.97)
Euro dummy	-10.304***	-35.277**	-8.017**
	(-3.57)	(-2.17)	(-2.39)
Constant	-58.294	-223.893	357.698***
	(-1.60)	(-1.32)	(5.05)
N	336	239	339
R^2	0.53	-0.16	0.26
Test of equality (p. value): Edu	0.024	0.050	0.000
Kleibergen-Paap	0.000	0.078	0.001
Anderson-Rubin	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000
Hansen J	0.992	0.655	0.579

*Notes: Robust z-statistics for IV (2SLS) regressions are reported in the parenthesis. The p-value refers to the test of equality between Edu*Fin.Dev and Edu*(1-Fin.Dev). Statistical significance is denoted at 1% (***), 5% (**) and 10% (*). Also see notes to Table 6.*

Table 8: Robustness: IV regressions for the role of financial crisis

	EHB_{it} = Equity home bias		
	(1) Tertiary education	(2) PISA	(3) Financial skills
Edu*Crisis*Fin.Dev	-0.451***	-0.306***	-2.873**
	(-2.63)	(-3.79)	(-2.18)
Edu*Crisis*(1-Fin.Dev)	-0.594***	-0.342***	-3.285**
	(-4.20)	(-4.10)	(-2.15)
Edu*(1-Crisis)*Fin.Dev	-0.587***	-0.352***	-2.137***
	(-4.61)	(-4.91)	(-3.93)
Edu*(1-Crisis)*(1-Fin.Dev)	-0.682***	-0.376***	-2.389***
	(-5.99)	(-4.72)	(-3.97)
GDP growth	0.576	-4.893	0.434
	(0.90)	(-1.31)	(0.37)
FDI	0.217	1.180	0.498
	(0.96)	(1.35)	(0.61)
Trade	-0.094***	-0.096	0.077
	(-4.11)	(-1.31)	(1.44)
Age	2.839***	7.472***	-2.168*
	(4.97)	(2.69)	(-1.93)
English dummy	-9.040***	-61.959**	2.209
	(-3.36)	(-2.48)	(0.51)
Financial openness	-2.919**	0.826	-6.489***
	(-2.02)	(0.17)	(-3.40)
Turnover ratio	-0.030	-0.001	-0.036
	(-0.60)	(-0.01)	(-0.67)
Domestic credit	-0.126**	-0.003	-0.069*
	(-2.50)	(-0.07)	(-1.81)
Current ratio	0.003	-0.280	-0.186
	(0.10)	(-1.28)	(-0.75)
Leverage	0.204	-0.156	0.077
	(1.39)	(-0.65)	(0.26)
Euro dummy	-10.248***	-36.515**	-8.367**
	(-3.55)	(-2.28)	(-2.30)
Constant	-54.521	-210.521	386.206***
	(-1.47)	(-1.25)	(3.62)
N	336	239	340
R^2	0.53	-0.21	0.11
Test of equality (p. value):			
Edu*Crisis	0.057	0.058	0.071
Edu*(1-Crisis)	0.056	0.142	0.002
Edu*Fin.Dev	0.269	0.553	0.629
Edu*(1-Fin.Dev)	0.489	0.694	0.613
Kleibergen-Paap	0.000	0.082	0.055
Anderson-Rubin	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000
Hansen J	0.987	0.685	0.469

*Notes: Robust t-statistics are reported in the parentheses. The p. values refer to the estimated coefficients on Edu*Crisis, Edu*(1-Crisis), Edu*Fin.Dev and Edu*(1-Fin.Dev) for different measures of education. Statistical significance is denoted at 1% (***), 5% (**) and 10% (*). Also see notes to Table 6.*

Table 9: Robustness: Baseline model results using the scaled equity home bias measures

	$Scaled\ EHB_{it}$ = Scaled equity home bias		
	(1) Tertiary education	(2) PISA	(3) Financial skills
Education	-0.239***	-0.170***	-0.439***
	(-5.91)	(-8.55)	(-6.74)
GDP growth	1.350***	0.686	1.127***
	(3.89)	(1.36)	(3.27)
FDI	-0.060	0.075	-0.044
	(-0.45)	(0.67)	(-0.35)
Trade	-0.048***	-0.061***	-0.005
	(-3.44)	(-3.44)	(-0.43)
Age	1.052***	3.339***	0.305
	(3.75)	(6.91)	(1.17)
English dummy	-3.702**	-3.511	-0.033
	(-2.20)	(-1.46)	(-0.02)
Financial openness	-5.275***	-3.330***	-6.854***
	(-8.08)	(-3.69)	(-10.31)
Turnover ratio	-0.006	-0.003	-0.020
	(-0.44)	(-0.21)	(-1.61)
Domestic credit	-0.024	0.002	-0.015
	(-1.45)	(0.09)	(-0.95)
Current ratio	-0.009	-0.041	-0.011
	(-0.35)	(-1.50)	(-0.42)
Leverage	0.108	0.002	0.132
	(0.81)	(0.01)	(1.00)
Euro dummy	-12.854***	-11.082***	-11.583***
	(-5.09)	(-3.96)	(-4.88)
Constant	35.283*	-55.316*	99.292***
	(1.81)	(-1.86)	(5.17)
N	345	244	349
R^2	0.61	0.66	0.62

Notes: Robust t-statistics are reported in the parentheses. Statistical significance is denoted at 1% (***), 5% (**) and 10% (*).

Table 10: Robustness: Employing the scaled equity home bias for different levels of financial development

	$Scaled\ EHB_{it}$ = Scaled equity home bias		
	(1) Tertiary education	(2) PISA	(3) Financial skills
Edu*(Fin.Dev)	-0.184***	-0.166***	-0.501***
	(-4.56)	(-8.39)	(-7.96)
Edu*(1-Fin.Dev)	-0.265***	-0.180***	-0.643***
	(-6.07)	(-8.73)	(-9.11)
GDP growth	1.302***	0.339	0.952***
	(3.75)	(0.68)	(2.80)
FDI	-0.084	0.057	-0.050
	(-0.64)	(0.57)	(-0.42)
Trade	-0.049***	-0.063***	-0.010
	(-3.63)	(-3.83)	(-0.89)
Age	1.253***	3.612***	0.446*
	(4.33)	(7.64)	(1.74)
English dummy	-4.476***	-4.931**	0.507
	(-2.66)	(-2.08)	(0.29)
Financial openness	-5.687***	-4.010***	-7.837***
	(-8.28)	(-4.25)	(-11.65)
Turnover ratio	-0.017	-0.016	-0.034***
	(-1.30)	(-1.23)	(-2.80)
Domestic credit	-0.035**	-0.015	-0.038**
	(-2.12)	(-0.64)	(-2.42)
Current ratio	-0.002	-0.036	0.001
	(-0.08)	(-1.29)	(0.04)
Leverage	0.144	0.062	0.217*
	(1.11)	(0.36)	(1.68)
Euro dummy	-12.898***	-11.316***	-10.638***
	(-5.15)	(-4.06)	(-4.75)
Constant	22.867	-69.645**	100.817***
	(1.14)	(-2.42)	(5.36)
N	345	244	349
R^2	0.62	0.68	0.65
Test of equality (p. value): Edu	0.003	0.001	0.000

*Notes: Robust t-statistics are reported in the parentheses. The p-value refers to the test of equality between Edu*Fin.Dev and Edu*(1-Fin.Dev). Statistical significance is denoted at 1% (***), 5% (**) and 10% (*). Also see notes to Table 9.*

Table 11: Robustness: The role of the financial crisis in the scaled equity home bias

	$Scaled\ EHB_{it}$ = Scaled equity home bias		
	(1)	(2)	(3)
	Tertiary education	PISA	Financial skills
Edu*Crisis*Fin.Dev	-0.209***	-0.172***	-0.575***
	(-3.25)	(-6.27)	(-4.13)
Edu*Crisis*(1-Fin.Dev)	-0.303***	-0.190***	-0.730***
	(-4.40)	(-6.47)	(-4.38)
Edu*(1-Crisis)*Fin.Dev	-0.173***	-0.162***	-0.480***
	(-3.83)	(-7.45)	(-7.09)
Edu*(1-Crisis)*(1-Fin.Dev)	-0.249***	-0.174***	-0.618***
	(-4.92)	(-7.72)	(-8.12)
GDP growth	1.280***	0.320	0.957***
	(3.70)	(0.63)	(2.79)
FDI	-0.079	0.066	-0.042
	(-0.59)	(0.65)	(-0.36)
Trade	-0.049***	-0.064***	-0.010
	(-3.58)	(-3.82)	(-0.92)
Age	1.257***	3.635***	0.448*
	(4.29)	(7.61)	(1.74)
English dummy	-4.513***	-4.909**	0.504
	(-2.67)	(-2.06)	(0.29)
Financial openness	-5.745***	-4.090***	-7.855***
	(-8.37)	(-4.34)	(-11.62)
Turnover ratio	-0.018	-0.018	-0.034***
	(-1.30)	(-1.28)	(-2.77)
Domestic credit	-0.034**	-0.014	-0.037**
	(-2.07)	(-0.59)	(-2.38)
Current ratio	-0.002	-0.035	0.001
	(-0.07)	(-1.17)	(0.02)
Leverage	0.145	0.060	0.219*
	(1.11)	(0.35)	(1.69)
Euro dummy	-12.911***	-11.196***	-10.590***
	(-5.13)	(-4.03)	(-4.71)
Constant	21.885	-66.131**	99.016***
	(1.08)	(-2.20)	(5.24)
N	345	244	349
R^2	0.62	0.68	0.65
Test of equality (p. value):			
Edu*Crisis	0.047	0.010	0.001
Edu*(1-Crisis)	0.021	0.011	0.000
Edu*Fin.Dev	0.602	0.710	0.526
Edu*(1-Fin.Dev)	0.490	0.598	0.537

*Notes: Robust t-statistics are reported in the parentheses. The p. values refer to the estimated coefficients on Edu*Crisis, Edu*(1-Crisis), Edu*Fin.Dev and Edu*(1-Fin.Dev) for different measures of education. Statistical significance is denoted at 1% (***), 5% (**) and 10% (*). Also see notes to Table 9.*

Table 12: Robustness: Using an alternative measure of financial development

	EHB_{it} = Equity home bias		
	(1) Tertiary education	(2) PISA	(3) Financial skills
Edu*(Fin.Dev2)	-0.201***	-0.153***	-0.458***
	(-5.30)	(-7.19)	(-7.40)
Edu*(1-Fin.Dev2)	-0.283***	-0.170***	-0.510***
	(-6.13)	(-7.55)	(-7.49)
GDP growth	1.293***	0.355	1.086***
	(3.87)	(0.69)	(3.16)
FDI	-0.103	0.034	-0.086
	(-0.77)	(0.33)	(-0.69)
Trade	-0.027**	-0.041**	0.020*
	(-2.00)	(-2.41)	(1.73)
Age	0.977***	3.141***	0.064
	(3.45)	(6.30)	(0.24)
English dummy	-8.475***	-9.536***	-4.302**
	(-5.09)	(-3.63)	(-2.50)
Financial openness	-5.405***	-3.823***	-7.128***
	(-8.58)	(-3.90)	(-10.91)
Turnover ratio	-0.043***	-0.052***	-0.047***
	(-3.07)	(-3.64)	(-3.66)
Domestic credit	-0.061***	-0.044*	-0.050***
	(-3.75)	(-1.92)	(-3.19)
Current ratio	0.012	-0.018	0.005
	(0.58)	(-0.98)	(0.23)
Leverage	0.167	0.089	0.182
	(1.30)	(0.53)	(1.39)
Euro dummy	-11.758***	-10.785***	-10.404***
	(-4.74)	(-3.97)	(-4.51)
Constant	41.887**	-40.313	119.222***
	(2.15)	(-1.37)	(6.08)
N	345	244	349
R^2	0.66	0.69	0.67
Test of equality (p. value): Edu	0.007	0.000	0.057

*Notes: Robust t-statistics are reported in the parentheses. The p-value refers to the test of equality between Edu*Fin.Dev2 and Edu*(1-Fin.Dev2). Statistical significance is denoted at 1% (***), 5% (**) and 10% (*). Also see notes to Table 4.*

Table 13: Robustness: The role of the financial crisis using an alternative measure of financial development

	EHB_{it} = Equity home bias		
	(1)	(2)	(3)
	Tertiary education	PISA	Financial skills
Edu*Crisis*Fin.Dev2	-0.212***	-0.163***	-0.476***
	(-3.73)	(-6.03)	(-3.92)
Edu*Crisis*(1-Fin.Dev2)	-0.337***	-0.186***	-0.550***
	(-4.41)	(-6.39)	(-3.89)
Edu*(1-Crisis)*Fin.Dev2	-0.196***	-0.147***	-0.451***
	(-4.56)	(-6.25)	(-6.54)
Edu*(1-Crisis)*(1-Fin.Dev2)	-0.259***	-0.161***	-0.497***
	(-4.79)	(-6.42)	(-6.54)
GDP growth	1.287***	0.337	1.100***
	(3.84)	(0.65)	(3.15)
FDI	-0.089	0.051	-0.082
	(-0.64)	(0.49)	(-0.65)
Trade	-0.028**	-0.043**	0.019*
	(-2.09)	(-2.48)	(1.66)
Age	0.998***	3.167***	0.074
	(3.49)	(6.28)	(0.27)
English dummy	-8.529***	-9.619***	-4.300**
	(-5.11)	(-3.65)	(-2.50)
Financial openness	-5.440***	-3.866***	-7.115***
	(-8.62)	(-3.89)	(-10.80)
Turnover ratio	-0.045***	-0.056***	-0.048***
	(-3.11)	(-3.65)	(-3.64)
Domestic credit	-0.060***	-0.043*	-0.050***
	(-3.70)	(-1.89)	(-3.17)
Current ratio	0.013	-0.016	0.005
	(0.62)	(-0.82)	(0.22)
Leverage	0.168	0.093	0.182
	(1.31)	(0.56)	(1.39)
Euro dummy	-11.767***	-10.755***	-10.370***
	(-4.73)	(-3.95)	(-4.49)
Constant	39.920**	-34.228	117.928***
	(2.03)	(-1.11)	(5.93)
N	345	244	349
R^2	0.66	0.69	0.67
Test of equality (p. value):			
Edu*Crisis	0.017	0.001	0.131
Edu*(1-Crisis)	0.067	0.002	0.123
Edu*Fin.Dev2	0.791	0.540	0.856
Edu*(1-Fin.Dev2)	0.382	0.394	0.740

*Notes: Robust t-statistics are reported in the parentheses. The p. values refer to the estimated coefficients on Edu*Crisis, Edu*(1-Crisis), Edu*Fin.Dev2 and Edu*(1-Fin.Dev2) for different measures of education. Also see notes to Table 5.*

Appendix

Table A1: Definitions of the variables

Variables	Description	Source
Tertiary education	This is measured as school enrolments to tertiary education. Tertiary school enrolment is the total enrolment in tertiary education (ISCED 5 and 6), regardless of age, expressed as a percentage of the total population of the five-year age group following on from secondary school leaving.	World Development Indicators (WDI) of World Bank
Finance skills	*'Finance skills'* question reads as 'finance skills readily available' and this statement is evaluated on a scale of 0-10.	IMD World Competitiveness Yearbook (WCY)
PISA maths score	Evaluates the knowledge and skills of 15-year-olds in mathematics.	IMD World Competitiveness Yearbook (WCY)
GDP growth	Annual percentage growth rate of GDP at market prices based on constant local currency.	World Development Indicators (WDI) of World Bank
Foreign Direct Investment (FDI)	Net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.	World Development Indicators (WDI) of World Bank
Trade	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Development Indicators (WDI) of World Bank
Age	Total population between the ages 15 to 64 is the number of people who could potentially be economically active.	World Development Indicators (WDI) of World Bank
English	This is a dummy equal to one if country has English as one of the official languages and zero otherwise.	British Council
Financial openness	This variable includes the presence of multiple exchange rates, the existence of restrictions on current account transactions, the existence of restrictions on capital account transactions and the requirement of the surrender of export proceeds.	Chinn-Ito Index of financial openness
Market turnover	It is the total value of shares traded during the period divided by the average market capitalization for the period.	World Development Indicators (WDI) of World Bank
Domestic credit	It refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment.	World Development Indicators (WDI) of World Bank
Current ratio	It is the ratio of total current assets to total current liabilities.	DataStream
Leverage	It is the ratio of total debt to total assets.	DataStream
Euro	Euro is a dummy equal to one if country is a member of the Euro-area and zero otherwise.	Eurozone website

Table A2: Distribution of the equity home bias and measures of education over 2001-2010

Country	Average equity home bias (%)	Tertiary education	PISA score	Financial skills
Argentina	86.53	66.33	385.34	63.65
Australia	79.40	72.75	518.84	75.45
Austria	50.60	52.72	502.02	74.31
Brazil	97.40	21.91	372.35	60.54
Belgium	45.87	62.64	520.61	70.55
Chile	82.63	50.36	417.18	75.67
Colombia	96.89	30.89	376.50	65.23
Czech Republic	82.35	47.63	505.00	53.83
Denmark	57.22	72.64	509.61	77.14
Egypt	98.39	30.98	-	-
Finland	59.03	90.56	544.32	75.82
France	66.18	54.65	499.87	70.00
Greece	90.51	78.18	458.24	60.66
Hong Kong	77.60	42.99	550.75	76.69
Hungary	82.43	58.15	490.42	63.33
India	97.92	12.65	-	73.73
Indonesia	99.43	17.64	375.87	47.35
Israel	90.10	57.81	444.86	76.84
Italy	54.57	61.89	470.73	53.11
Japan	78.65	55.53	528.03	56.33
Malaysia	96.38	30.63	-	67.93
Mexico	98.10	24.60	405.31	49.74
Netherlands	33.47	59.15	530.68	73.32
New Zealand	57.24	76.81	521.23	64.23
Norway	45.35	75.50	494.18	70.05
Philippines	99.52	28.70	-	72.66
Poland	96.57	64.46	493.84	50.56
Portugal	57.67	56.99	473.89	56.58
Russia	98.51	70.32	470.81	60.91
South Korea	92.82	94.99	545.63	54.50
Spain	85.39	67.85	482.54	60.00
Sweden	56.46	76.22	500.96	76.37
Switzerland	57.30	46.54	530.61	79.07
Thailand	98.33	43.33	417.62	57.54
Turkey	99.57	35.49	431.77	68.51
UK	56.48	59.35	493.62	64.90
USA	42.77	82.90	481.41	77.05
Venezuela	95.28	55.22	-	49.64

Notes: Table reports the average equity home bias and different measures of education across countries over a period of 2001-2010. The portfolio holdings data are taken from Coordinated Portfolio Investment Survey (CPIS) held by the IMF and equity market capitalisation data for the period of 2001-2010 are from World Federation of Exchanges. Financial skills and PISA scores are taken from IMD WCY and tertiary education is drawn from World Bank.

Table A3: Correlation matrix of explanatory variables

	Financial education	PISA score	Tertiary education	Secondary education	GDP growth	FDI	Trade	Age	English dummy	Financial openness	Turnover ratio	Domestic credit	Corruption perception index	Current ratio	Leverage	Euro dummy
Financial education	1.000															
PISA score	0.393	1.000														
Tertiary education	0.244	0.565	1.000													
Secondary education	0.381	0.547	0.528	1.000												
GDP growth	-0.036	-0.245	-0.177	-0.295	1.000											
FDI	0.167	0.198	-0.093	-0.064	0.078	1.000										
Trade	0.224	0.366	-0.128	-0.161	0.093	0.624	1.000									
Age	-0.096	0.357	0.127	-0.235	0.156	0.284	0.581	1.000								
English dummy	0.268	0.278	0.174	0.183	-0.020	0.170	0.204	0.172	1.000							
Financial openness	0.363	0.530	0.229	0.442	-0.389	0.173	0.195	-0.149	0.176	1.000						
Turnover ratio	0.141	0.366	0.367	0.133	-0.174	-0.031	-0.044	0.119	0.176	0.147	1.000					
Domestic credit	0.278	0.468	0.239	0.347	-0.380	-0.031	-0.011	-0.073	0.301	0.521	0.437	1.000				
Corruption perception index	0.692	0.718	0.422	0.662	-0.285	0.141	0.206	-0.091	0.374	0.684	0.229	0.564	1.000			
Current ratio	-0.032	0.030	-0.008	0.016	-0.206	-0.039	0.061	0.010	0.057	0.080	0.098	0.029	0.003	1.000		
Leverage	-0.033	-0.088	0.152	0.099	-0.213	-0.116	-0.183	-0.164	-0.092	0.145	0.067	0.195	0.065	-0.102	1.000	
Euro dummy	0.077	0.218	0.169	0.365	-0.249	0.019	-0.014	-0.156	-0.279	0.419	0.082	0.156	0.225	-0.057	0.304	1.000

Notes: Table reports the correlation matrix between different explanatory variables used in the models.